Course: ELEC 475/575
Term: Spring 2021
Room: Online
Class: TuTh, 9:40AM – 11:10AM

COURSE: ELEC 475/575 LEARNING FROM SENSOR DATA

INSTRUCTOR CONTACT INFORMATION

Instructor: Behnaam Aazhang
Office: BRC 963
Email: aaz@rice.edu
Office Hours: On zoom by appointment via email

COURSE OBJECTIVES AND LEARNING OUTCOMES

This course will offer undergraduate and graduate students' depth in a few topics while focusing on applications; leading students to start a formulation, develop algorithms, and finally consider building a system.

The course will focus on a probabilistic approach to working with sensor data, which includes characterizing statistical properties of data, designing a system based solely on data, and a statistical analysis of the performance of the resulting system. The framework to study the physical system, therefore, will be data driven. Topics will include representation of data, estimating key characteristics of data, and powerful data processing tools. These tools will be used in inference, regression, classification, and clustering problems. The course will step back to consider sensors and systems used to gather data. Topics will include sensors, electrodes and biosensors as well as amplifiers and microprocessors. The course will conclude with applications to recording and stimulations of cardiac and neurological systems.

PREREQUISITE

Introductory courses in probability and in linear algebra.

REQUIRED TEXTS AND MATERIALS

A textbook is not required. Copies of class notes will be provided.

- Christopher M. Bishop, "Pattern Recognition and Machine Learning" 2007
- John G. Webster, "Medical Instrumentation: Application and Design" 2010
- David MacKay, "Information Theory, Inference, and Learning Algorithms" 2003

EXAMS AND PAPERS

Two exams and 5 homework sets as assigned.

GRADE POLICIES

Homework 40% (5 homework sets), Exam 1 and 2 each 30%

RICE HONOR CODE

In this course, all students will be held to the standards of the Rice Honor Code, a code that you pledged to honor when you matriculated at this institution. If you are unfamiliar with the details of this code and how it is administered, you should consult the Honor System Handbook at http://honor.rice.edu/honor-system-handbook/. This handbook outlines the University's expectations for the integrity of your academic work, the procedures for resolving alleged violations of those expectations, and the rights and responsibilities of students and faculty members throughout the process.

DISABILITY SUPPORT SERVICES

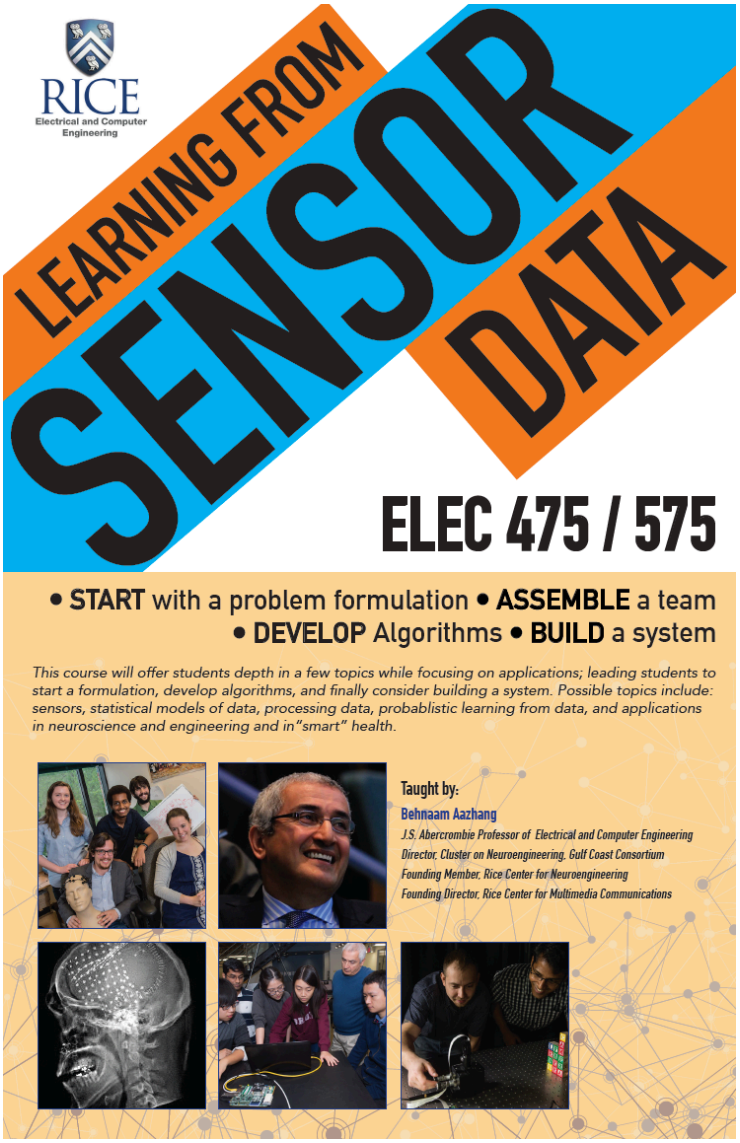
If you have a documented disability or other condition that may affect academic performance you should: 1) make sure this documentation is on file with Disability Support Services (Allen Center, Room 111 / adarice@rice.edu / x5841) to determine the accommodations you need; and 2) talk with me to discuss your accommodation needs.

TEACHING ASSITANT (TA) GRADERS

Jeff Lievense-- lievense@rice.edu (TA) and a few graders to be announced later.

SYLLABUS CHANGE POLICY

This syllabus is only a guide for the course and is subject to change with advanced notice.


RICE
Electrical and Computer Engineering
LEARNING FROM
SENSOR
DATA
ELEC 475 / 575
• START with a problem formulation • ASSEMBLE a team
• DEVELOP Algorithms • BUILD a system
This course will offer students depth in a few topics while focusing on applications; leading students to start a formulation, develop algorithms, and finally consider building a system. Possible topics include: sensors, statistical models of data, processing data, probablistic learning from data, and applications in neuroscience and engineering and in "smart" health.
Taught by:
Behnaam Aazhang
J.S. Abercrombie Professor of Electrical and Computer Engineering
Director, Cluster on Neuroengineering, Gulf Coast Consortium
Founding Member, Rice Center for Neuroengineering
Founding Director, Rice Center for Multimedia Communications